Application No.: 09/343,684 Docket No.: 21029-00182-US

REMARKS

This preliminary amendment to the present RCE is submitted for the Examiner's consideration. Claim 14 was previously cancelled and claim 10 amended in the amendment and second request for reconsideration filed May 22, 2003. Claim 10 is further amended herein.

The following summary of the claimed invention should be useful to the Examiner. As explained on page 7, line 24-page 8, line 15, the input information is of different types, such as: flow rates, fluid pressures, fluid consumption, actuator positions, etc. As further explained on page 8, lines 16-26, the system controls a plurality of different types of actuators for: burners and their feeds, electrical heating equipment, bubblers, melters, etc. in response to the multiple inputs.

In the primary reference to Aoki a method is disclosed for controlling a process where a time delay occurs between a change in a single input and an observable corresponding change in the process (dead time). Fuzzy logic compares this single input prior information to a target value. In paragraph 3 of the final rejection dated December 4, 2002, the Examiner states that "Aoki was cognizant of multiple inputs - - ." This presumably refers to Aoki, column 5, lines 21-27. However, this conclusion is believed to be in error. Aoki does recognize that different types of input disturbances will result in a delayed (dead time) respective reaction. However, Aoki only handles a single input and output variable at a time as evidenced in column 5, lines 47 and 48 wherein it is stated that "(c)onsideration is made here of a dead time process with one input and one output." (*emphasis added*).

The Aoki method can evaluate integral, proportional and differential changes in the input of a single variable. Fuzzy inference is used to estimate a variation in the process response of a single associated output occurring upon lapse of a dead time on the basis of the value of an input evaluating criterion of the single variable. Both embodiments (Figs 7 and 8) are clearly directed to control of a single variable as now explained.

In the serial control system of Fig 7 of Aoki, the fuzzy predictor 1 predicts a single process output variation Δx corresponding to the value of input evaluating criterion and occurring upon lapse of dead time, by fuzzy inference based on manipulated input u, process response output x, known disturbance d and other prior information. See column 9, line 65 – column 10, line 2.

In the parallel connection to the fuzzy PI control, as shown in FIG. 8, the fuzzy PI controller 2 infers control amount Δu_{PI} to compensate for the current process output single variation e(t), while a fuzzy L compensator 5 infers control amount Δu_L to compensate for the single variation Δx of the process response based on manipulated input u and other process inputs. Results of such inference are added to produce control output u to compensate for the deviation occurring upon lapse of dead time L, which is applied to the process 4 having a dead time (Col 10, lines 41-51).

The fuzzy logic of Aoki for a glass furnace is explored in column 13, lines 5-29, wherein the temperature (x° C.) at the ceiling of the melting furnace near a material feed side was used as a control parameter (process output), and the supply rate (ul/hr.) of heavy oil for combustion as operating parameter (manipulated input). The thermal characteristics of the temperature at the ceiling near the material feed side used as the control point are known through furnace operating data analysis to be capable of being approximated to a system having a dead time of about five hours. Thus, Aoiki is only directed to a rudimentary control of a single variable, namely ceiling temperature. There is no suggestion or teaching as to how a plurality of input variables affect a plurality of furnace actuators of different types to in turn affect a plurality of furnace operations as represented by the language in claim 10, namely, "a plurality of sensors for detecting different types of operating conditions in a furnace" and "the controller means generating a plurality of output signals for respective actuators that will control melting in the furnace." The Examiner's reliance on multiple sensors as shown in Haissig does not render the combination of Aoki and Haissig obvious since there is no reasonable teaching in the references of the method steps as discussed above.

It is applicant's position that the utilization of image information in a fuzzy logic controlled is not disclosed by any reasonable combination of the cited references.

Although video cameras have been shown by Victor and Miller to monitor events inside a furnace, there is an insufficient bridge in teaching that the image information processed by a mathematical model, can be used by a fuzzy logic controller dealing with a plurality of furnace operations.

The addition of the learning means present in independent claim 10 is significant, wherein the learning means defines the laws of different types of furnace operations, selectively from actual furnace operation, or by simulation of furnace operation using a mathematical model. On page 2, paragraph 3 of the Office Action, it is mentioned that the learning means is disclosed by Aoki in column 13, lines 13-22. It is applicant's contention that this cited portion of Aoki seems more appropriately linked to the claimed means for storing operator set points as opposed to the claimed learning means

Accordingly, claim 10 currently amended differentiates over any reasonable combination of the references and the combination of all the references cited fails to present a *prima facie* case of obviousness.

Dependent claims 12, 13, 15 and 18 add further distinctions.

In view of the above, consideration and allowance are, therefore, respectfully solicited.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

The Commissioner is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185.

Dated: December 4, 2003

Respectfully submitted,

By _____

Morris Liss, Registration No.: 24,510
CONNOLLY BOVE LODGE & HUTZ LLP
1990 M Street, N.W., Suite 800
Washington, DC 20036-3425
(202) 331-7111
(202) 293-6229 (Fax)